APPENDIX C

ANCHOR MITIGATION & HARD BOTTOM AVOIDANCE PLAN

FAIRWEATHER

PACIFIC, LLC

ATLANTIC RICHFIELD COMPANY (ARCO)

REVISED PRC-421 PIER REMOVAL PROJECT

ANCHOR MITIGATION

&

HARD BOTTOM AVOIDANCE PLAN

ARCO PRC-421 ANCHOR MITIGATION PLAN

The Anchor Mitigation Plan ensures that anchoring is conducted without affecting sensitive seafloor features such as hard bottom habitat, kelp beds, rock outcroppings, etc., and minimizes anchor impact to the seafloor. This is accomplished by utilizing a mooring design, which incorporates accurate coordinates for all subsea features in the vicinity of the project site, and through mooring system deployment and recovery procedures incorporated within this document.

The proposed project vessel operators are familiar with anchor mitigation requirements and the enclosed procedures as they have been operating in support of offshore energy, military and scientific operations locally for a number of years. These operations include diving and construction support, which typically require anchoring to provide a safe, stable work platform. Geographical areas of operation have primarily been within the Santa Barbara Channel and Santa Maria Basin, however, operations have been conducted from San Diego to San Francisco.

Equipment Description(s) - Descriptions of equipment utilized during anchoring and sub-sea facility locating are provided within this Section. Anchoring operations will be preceded by location of the sea floor features and existing sub-sea facilities utilizing current and historical data regarding sub-sea facilities and features.

Project Vessels - Multiple vessels will be utilized during the project which are described as follow:

- *Siuslaw* Load Line Barge- The *Siuslaw*, a Load Line Barge classified by ABS for offshore use, will be utilized to support all site operations including topsides removal, explosives detonation, column nesting, pile driving and quarry rock placement. All diving equipment will be located on the Siuslaw. The *Siuslaw* is 240' LOA with a 60' beam. There will be sanitary facilities aboard the *Siuslaw*, but there are no personnel accommodations.

- Tug *KAHU* –The tug *KAHU* will be utilized as the primary tow vessel for the Siuslaw and will remain with the Siuslaw during its time at site. The *KAHU* is a 72' LOA x 24' wide vessel rated at 2220 horsepower. The vessel is equipped with 2 DDEC-MTU 16/2000 rated 1110 hp main engines.

- Tug *Larcona* - The *Larcona* will be utilized to assist in running anchors and anchor wires during mooring operations as well as being utilized as the primary tow vessel for the quarry rock barge(s). The *Larcona* may also be used to support survey equipment during anchor placement. The *Larcona* is a 78' LOA x 26' wide vessel rated at 2000 horsepower. The vessel is equipped with 2 16V149 GMC main engines and a SMATCO #40-DADT-100 double-drum towing winch.

- M/V *Julie* - The M/V *Julie* will be available as a field vessel and will be utilized, as required, to assist in transporting personnel and equipment to and from the *Siuslaw* and Ellwood Pier as well as providing site security. Additionally, the M/V *Julie* may be used to support survey equipment during seabed debris surveys. The *Julie* is a 40' LOA x 13.5' wide line handling tug.

Fugro STARFIX Positioning Specifications - Specifications for inspection and anchoring operations are as follows:

- Vessel Positioning - Positioning of the vessels will be accomplished through the utilization of a DGPS positioning system and integrated navigation software. The Fugro West software is operated on a Pentium shipboard computer that serves as a controller for a variety of input/output devices. The differential method of using GPS will be a viable way of enhancing the accuracy of the GPS over the survey area. Real-time corrections will be transmitted via dedicated satellite transponder to the vessel.

  The corrections themselves are pseudo-range corrections and range-l-ate corrections for every satellite in view. The GPS base stations that collectively comprise of the Wide Area Differential (WAD) network are located throughout North America. These base stations make real-time differential observations of the GPS satellite constellation in their view. The differential data is then modemed to the STARFIX control center located in Houston, Texas at the Fugro-Chance STARFIX Division office. At the control center, the data is further enhanced by applying corrections for ionospheric and tropospheric corrections. The enhanced data is then uplinked to a dedicated communication satellite transponder where it is simultaneously transmitted to the vessel. On board the vessel a dedicated WAD computer compiles received time tagged data with the vessels GPS position and outputs the DGPS position to the navigation computer.

  This method of transmitting WAD requires no local base station, has no radio range or line-of-sight considerations and will produce a position in the order $\pm$1.0 meter accuracy or better. Furthermore, the update rate of this method is in the order of 1.5 to 2 seconds and has a very high reliability rate. Additional input data including vessel heading information from the compass will be logged at every fix mark. The computer logged position information will be stored on disk and will also be backed up by hard copy print out. Position fix marks will be generated from the computer system at the desired intervals along pre-plotted tracklines for the survey.

  Fugro will utilize the *Hypack for Windows* PC based navigation system. The system has the capability of interfacing DGPS positions of latitude and longitude and converting them to the appropriate California State Plane coordinates as necessary. In addition to data acquisition of positioning data the software can interface with external instruments such as echosounders, Ultra Short Base Line acoustic

systems, side scan sonar and geophysical equipment for annotation of records. One of the system's strengths is its ability to import AutoCAD generated maps and charts and have them depicted on several graphic display monitors that can be stationed throughout the vessel. Detail of bathymetry, hazards, landmasses or special details can be depicted in two dimensions (X & Y) in a north up orientation. The graphic monitor displays a scaled depiction of the vessel orientation to the survey lines and or subsurface targets, range and bearing from the vessel's antenna to the target. The surveyor can control the scaling of the graphics to assist the vessel helmsman in fine-tuning the vessel's position.

- Subsurface Acoustic Tracking System - Subsurface acoustic positioning of the ROV will be accomplished using the Ocean Research Equipment (ORE) 4220 Trackpoint II Ultra Short Baseline system. The system will determine relative range and bearing from the surface vessel to a mini transponder attached to the ROV providing accurate positioning data of the underwater structure and or target. The system is comprised of a control and display unit (CCU), a 100' cable, a transducer and an acoustic beacon mounted on the ROV or underwater equipment. The CCU provides the operator with easy menu driven command and control of system parameters. Range and bearing information is output to the surface positioning system for further transformation to a real-time position. Ultra short baseline system derives its name from three sensors located on the transducer for transmitting and receiving acoustic signals. The three sensors form an ultra short baseline between themselves that receive acoustic signals. The returning acoustic signal from the beacon arrives at each sensor at a different time. This time phase difference comparison is processed by the central processing unit to derive a direction and distance to the transmitting beacon to an accuracy of 0.5% of the slant range from the surface to the seafloor structure.

Phantom 2+2 ROV System - The Phantom 2+2 is a highly maneuverable electric ROV system capable of working to depths of 2000 fsw. The vehicle is equipped with 6 thrusters to provide control of the vehicle; 4 fore/aft, 1 lateral, and 1 vertical. Onboard sensors include CCD color video, low light black and white video, 35mm color still camera and strobe, color scanning sonar, depth sensor, and compass to provide vehicle heading. The vehicle control console and consumable/spare parts are provided in a 8' x 8.5' x 20' air conditioned control van. In addition the system comes with a hydraulic winch and crane to launch and recover the ROV.

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General Anchoring Procedures - Anchors will be set in precise predetermined locations. Upon completion of the pre-project survey inspection and data review the navigator will pre-plot the actual sea floor feature locations prior to anchoring. In addition, the anchor coordinates will be adjusted to ensure that actual conditions are utilized. The barge foreman, navigator, and the support boat captain(s) will determine the order in which anchors are set, dependent on onsite weather conditions. A pre-plot utilizing as-built coordinates, which depicts anticipated mooring configuration is included as an attachment to this document.

Anchors will be set on position with the anchor handling boat. Using the anchor handling boat for all anchor sets, rather than attempting to move the support boat to each anchor location, eliminates the risk of dragging an anchor on the seafloor.

The anchor handling boat will pull each anchor into position, one anchor at a time. To run an anchor, the boat will come alongside the designated anchor and receive the anchor's crown line and buoy from the vessels deck crew. After securing the crown line, the boat will move to the position where the anchor is to be set.

The support boat captain and/or project superintendent will supervise release of the anchor wire and operation of the winches as the anchors are placed into position.

Operational Procedures - Coordination between the two vessels and crews are essential. The anchor-handling vessel follows certain procedures to perform various anchoring or towing tasks. These procedures have been broken into two categories and are listed below.

Running Anchors - From the Support Boat

a. The anchor-handling vessel pulls alongside the support boat at the location of the anchor.

b. The anchor handling vessel crew is thrown a heaving line from the support boat to which the crown line and crown line buoy are attached.

c. The crew attaches the crown line to the vessel's towing bit or the towing winch. The bit and/or towing winch are welded to the deck at a point forward of amidships, allowing the vessel more maneuverability while towing.

d. The anchor is pulled to a position dictated to the vessel captain by the navigator.

e. Upon reaching the anchor location, the project superintendent will instruct

the anchor handling vessel captain to release the anchor.

Repositioning an Anchor - If weather conditions change it may be necessary to reposition an anchor. Repositioning procedures are as follows.

a. The anchor handling vessel captain positions the vessel adjacent to the crown line buoy as it floats in the water.

b. The anchor handling vessel deckhand, utilizing a boat hook, retrieves the crown line and crown line buoy to the deck of the anchor-handling vessel.

c. The crew attaches the crown line to the vessel's towing bit or the towing winch. The bit and towing winch are welded to the deck at a point forward of the propellers, allowing maneuverability of the vessel while towing or pulling.

d. The anchor is pulled to its pre-plotted position as directed to the captain by the on-board navigator.

e. Upon reaching the new anchor location, the project superintendent will instruct the vessel captain to release the anchor.

Special Considerations - The anchor handling boat will remain onsite during all mooring operations.

Charts - The charts provided herein describe the various phases and positions of the Siuslaw Load Line barge and preliminary anchor placement. Please note that there is only one anchor setting for all barge positions. These anchor placements are based on 1999 survey information and will be adjusted following the pre-project survey performed approximately 30 – 60 days prior to site arrival of the offshore spread.

Plate 1 of 6 This chart describes the initial position of the Siuslaw and anchor placement. This position is suitable for topsides structure removal, seabed debris cleanup, jetting under the columns and placement of the Linear Shaped Charges.

Plate 2 of 6 This chart indicates the "standoff" position (150' distant) for the Siuslaw during the actual detonation of the Linear Shaped Charges.

Plate 3 of 6 Two positions of the Siuslaw are indicated on this chart. The nearshore position depicts the pier piling debris recovery and nearshore well

conductor casing removal position. The offshore position depicts the approximate position during pile driving. Note that during pile driving there will be some limited amount of movement NW and SE.

Plate 4 of 6 Two positions of the Siuslaw are indicated on this chart. The offshore position depicts the position for the Siuslaw to accept the quarry rock barge alongside. The nearshore position indicates an approximate position during quarry rock placement. Note that during quarry rock placement there will be limited movement N, S, E & W to achieve proper rock coverage over the toppled columns.

Plate 5 of 6 This chart depicts the maximum swept area of the anchor lines from the Siuslaw positions in Plates 1 through 4 above.

Plate 6 of 6 This chart identifies the locations of the remnant pier piling locations inshore of the toppled columns.